Project Introduction

We propose to create an automated, real-time, remote turbulence detection and diagnostics system for the National Airspace System (NAS). The system is remote in the sense that it does not mount any sensors onboard any aircraft, nor does it add any software to Flight Deck (FD) avionics systems. The system exploits data mining to search through thousands of aircraft surveillance measurements in real-time as aircraft fly in the NAS. We propose to use Automatic Dependent Surveillance ? Broadcast (ADS-B) information as the basis of atmospheric wave and turbulence detection, and combine this with satellite-based visual and infrared imagery to complete the diagnostics. We design the system to access a large network of ADS-B receivers across the NAS. Automated analysis of ADS-B aircraft altitude and velocity information is used to detect the presence of mountain waves and Mountain Wave Turbulence (MWT) in the vicinity of steep terrain as well as atmospheric waves and turbulence from other sources, for instance, Convective Induced Turbulence (CIT). When combined with other weather state information gained by in situ sensors, satellite, and radar-based technology in the NAS, our SBIR effort will allow for a total situational awareness of mountain wave, MWT, and CIT information in the Continental United States (CONUS). Because ADS-B is mandated by 2020, the percentage of aircraft using ADS-B will grow each year, and this in turn will benefit all who use our innovation.

Primary U.S. Work Locations and Key Partners

Turbulence Event → Burst Signature → Alert to Dispatcher

Real-Time Data Mining Analysis of 1-Sec ADS-B across the NAS will provide timely turbulence warnings to airline dispatchers and pilots.
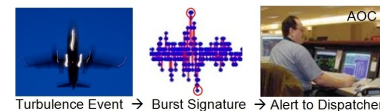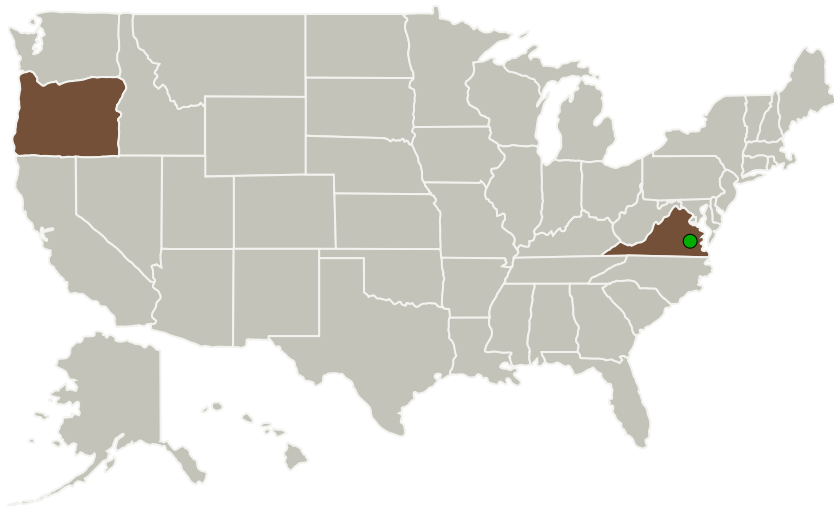
Turbulence Awareness via Real-Time Data Mining, Phase I Briefing Chart Image

Table of Contents

For more information and an accessible alternative, please visit: https://techport.nasa.gov/view/93808

Organizations Performing Work	Role	Type	Location
The Innovation Laboratory, Inc.	Lead Organization	Industry Women-Owned Small Business (WOSB)	Portland, Oregon
🟢 Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations	
Oregon	Virginia

Images

Briefing Chart Image
Turbulence Awareness via Real-Time Data Mining, Phase I Briefing Chart Image
(https://techport.nasa.gov/image/125934)

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
The Innovation Laboratory, Inc.

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management
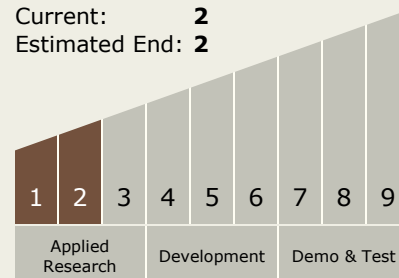
Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Jimmy Krozel

Technology Maturity (TRL)

Start: **1**
Current: **2**
Estimated End: **2**

1	2	3	4	5	6	7	8	9
Applied Research			Development			Demo & Test		

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Page 2

Technology Areas

Primary:

- TX16 Air Traffic Management and Range Tracking Systems
  └ TX16.4 Architectures and Infrastructure